
ASSESSMENT OF APPROXIMATE METHODS FOR WIDTH FLUCTUATION CORRECTION

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Hauser-Feshbach formula for Compound Nucleus cross section is known to be invalid when only a few reaction channels are competing. This so called width fluctuation effect is commonly treated in terms of two approximate methods: the one by Moldauer and the other one known as HRTW. Later, an exact solution to the problem has been formulated by the Heidelberg group in a form of the triple-integral formula. This approach, however, involves lengthy computation and approximate approaches continue to be used in reaction calculations.

Using the exact triple-integral expression for compound nucleus cross section as a benchmark, the accuracy of the HRTW and Moldauer approximation methods is compared for a wide range (more than 8000) of physically plausible cases. The Moldauer method is found to give superior results, although still with significant errors for weak elastic cross section. An improved formula for the elastic enhancement factor is presented and assessed, and is shown to improve accuracy of both methods. Finally, the convergence to exactness of the approximate methods in the high-absorption limit is investigated.